737

this is wrong no!

Y/HG-0032

BEHAVIOR OF MERCURY IN SUSPENDED SOLIDS AND BOTTOM SEDIMENTS

by

William P. Bonner
Professor

and

Rafael B. Bustamante
Professor and Chairman

Department of Civil Engineering
Tennessee Technological University
Cookeville, Tennessee 38501

Water Resources Research Center
The University of Tennessee
Knoxville, Tennessee 37916

Research Report No. 50 July 26, 1976

SUMMARY

Mercury, whatever the chemical form, is considered to be potentially toxic to man. Although there are many sources from which mercury may find its way to man, this work addresses itself to the aquatic environment and interactions between the water, sediment and selected biological forms. The objectives of the work were to provide a better understanding of the relationship between the several components which contribute to the cycle of mercury in the aquatic environment.

Collectively, the results show that mercury as mercuric chloride, mercuric sulfide, phenyl mercuric acetate and metallic mercury become associated with sediments very rapidly and with time natural mechanisms in the sediments tend to stabilize or bind the mercury and make it less available to the aquatic environment. Methylation, which is considered to be one of the important mechanisms by which mercury is released from sediments was observed for all mercury-sediment systems except mercuric sulfide. Thus, as mercury is converted to mercuric sulfide in anaerobic sediments the mercury should become stable.

Organic components of the water-sediment system play an important role as a sink for the mercuric ion. On a dry weight basis, humic acid has from 1,000 to 100,000 times greater capacity for adsorbing mercury than the inorganic components normally found in sediments and released a negligible quantity of the adsorbed mercury under normal environmental conditions. Peat and fumaric

acid also readily bind mercury. Chlorella, a component of a food chain leading to man readily adsorbs mercuric mercury; thus, providing a means of concentrating mercury in the food chain.

Temperature is an important consideration in both the uptake and elimination of phenyl mercury by goldfish. The range in biological half-life from 12 to 25 days indicates the effect of temperature on elimination. Seasonal temperature variations could thus be an important factor influencing the toxicity of mercury to aquatic organisms.

The presence of inorganic forms of mercury and selenium in equimolar concentrations exhibit typical antagonistic effects on toxicity. Collectively, temperature, and the presence of natural organic materials and antagonistic agents could significantly reduce the possibility of mercury accumulation in food chains leading to man.

More detailed observations and conclusions as well as additional supportive data may be obtained by referring to the appropriate work given in the acknowledgments.